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March 18th, 2010

Ms. Marlene H. Dortch
Secretary
Federal Communications Commission
445 12th Street SW
Washington, DC 20554

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Federal Communications Commission
Office of the Secretary

Re: Notice of Ex Parte Communication, GN Docket No. 09-191, WC Docket No. 07-52

Dear Ms. Dortch:

On February 25, 2010, Tom Anschutz, AT&T Labs; Jay Rolls, Cox Communications; Lauren Van Wazer, Cox Enterprises; David Young, Verizon; Fred Baker, Cisco; Kevin Kahn, Intel; Scott Jordan, U.C. Irvine[1]; Robb Topolski, New America Foundation; Dave Tennenhouse, New Venture Partners; and Art Spivy, Clearwire met with members of the Commission to discuss issues associated with the open Internet and technical methods that service providers currently use or in the future contemplate using to manage and offer prioritized services on their networks. This meeting was organized as part of the Technical Advisory Process (TAP), which was created to provide the Commission engineering expertise on network management issues for the Internet. These meetings are intended to provide an forum for discussion of concepts related to network management of both Broadband Internet Access Service and other services that may be offered on converged network elements by service providers. As such, concepts and issues discussed do not necessarily indicate formal policy of the companies or institutions represented. Therefore, while this ex parte describes the subject matter discussed and provides a list of attendees, specific attributions to individuals are omitted. A full list of meeting participants is included as an attachment.

The purpose of this meeting was to continue, as part of an ongoing process, a discussion of the techniques for management of packet-based networks; how such technologies are applied to the management of Internet service networks and other packet service networks; and, in the application of such technologies, what issues may exist in relation to the Commission's efforts to preserve an open Internet.

Previous meetings had focused on matters involving how service providers manage unwanted and unlawful content and the general issue of network congestion. This

[1]Scott Jordan participated in this meeting as a subject matter expert and did not represent the University of California, Irvine, with which he is associated.

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meeting began with a more detailed discussion regarding how prioritization is used today or is being considered for use in the future to manage services on converged platforms.

It was noted by participants that convergence--the ability of a common platform to support or transport different types of services--is an evolutionary trend driven by technology changes. Converged networks are seen as beneficial to society since they can both lower cost and spur innovation. However, convergence can blur the technical distinctions between similar services that are delivered via different methods. It was noted for example that video services can be supported technically in a number of different ways: through edge caching, through the use of Content Delivery Networks, or through implementation of Video on Demand Services. It was suggested that using distinctions between the technical delivery methods as a basis for applying different policies would be difficult.

It was brought out in the discussion that service prioritization is apparently already being used today to manage multiple services that share common resources such as the fiber or cable that carries various communications services to the consumer. The term "service prioritization" is a broad term used to describe various techniques that differentiate between service types or classes and manage the allocation of network resources among these different service classes. Some of these service classes are apparently being given higher priority access to network resources within parameters set by the service provider so as to ensure that other service classes are not affected significantly.

Some participants asserted that studies have shown that in environments with mixed service classes, e.g., a network supporting both voice service and a data transfer service, such management techniques can greatly lower the investment cost to support both services on a common platform, and that the effect of such practices are limited to periods of congestion on the network. It was also discussed that priority and QOS mechanisms are typically not carried across different networks and generally exist only with the context of a single service provider's network. This can complicate the extension of these mechanisms to potential Internet service offerings and may restrict how they can be applied. For example, a consumer's traffic might receive priority treatment within a service provider's network but traffic from an application provider situated on a different network and serving that customer would not be similarly treated.

Another set of scenarios for service prioritization was presented for discussion: a) service provider uses priority to manage services it provides but won't provide prioritization for the benefit of others' services; b) service provider allows user to set priority for service; and c) application provider pays service provider for higher tier service. Variants of some of these scenarios can be found in practice today. For example, service providers do provide VoIP telephone service to consumers through priority mechanisms (scenario *a* above), and consumers can select high-bandwidth Internet service offerings from their service provider (scenario *b* above). Some participants suggested that only scenario *b* works while others suggested all should be permitted or that all should be permitted providing that somehow scenario *c* is made an open process.

Discussion also centered on the relationship between the consumer and an application or application service provider. There was a general view expressed that priority decisions explicitly made by the consumer are acceptable. The practicality of this for the average consumer was debated, especially for the case where prioritization decisions are made dynamically. It was suggested by some that prioritization decisions could be made on the basis of particular classes of applications chosen by the consumer, which can serve as a proxy for the consumer.

The discussion extended this construct to network-based application providers selected by the consumer. This was extended to cases where the application or application service provider might subsidize access or priority access for the benefit of the consumer. As one example, the Kindle was discussed as an instance where network access is subsidized by the application provider. The context of this discussion served to differentiate between service prioritization decisions made by network service providers and others.

Against this backdrop of service prioritization and service tiers, the concept of fairness was discussed. One participant expressed a concern that the presence of "enhanced services" suggests there are "unenhanced services" and that this can impact consumers and small innovators. Again, some participants argued that fairness is only at issue during periods of congestion and that during congestion periods many factors need to be considered making issues of fairness complex. As an example, it was noted that even in the context of an Internet access service offering, the concept of fairness can be difficult. Some applications can use UDP protocol to consume considerable bandwidth, causing TCP streams to slow down; while some applications may open many TCP streams for a single application to increase accessible bandwidth. During periods of network congestion, such techniques may appear to be "unfair" in that they would allocate a disproportionate share of resources to the application, perhaps at the expense of other users.

Participants described some of the techniques commonly applied to manage network congestion and provide service prioritization. This is a complex subject not limited to a single point in the network. It was acknowledged that some solutions advocated in the past, e.g., buffering, are now felt to contribute towards extending congestion. Overall, network congestion and congestion control involves the user application, the user computing resource or operating system, customer premise equipment, link and network congestion mechanisms of the service provider, and flow control mechanisms that can be implemented end to end. Service providers can manage resources within their networks but have limited ability to extend such policies beyond their network.

One service provider then described their implementation of a bandwidth control mechanism for congestion management. Their objective was to ensure that during heavy traffic periods, network resources are effectively shared among all consumers and not disproportionately allocated to just a few. They noted that their policy is implemented only upon a specific congestion trigger being reached, upon which heavy users have their traffic marked at lower level priority. This occurs at the link layer of the network. Packet scheduling will then ensure that higher priority traffic is served first. When traffic

returns to normal levels, priority levels are reset to default values. Studies since implementation of this method have indicated that even during congestion heavy users still receive service, albeit at a lower bandwidth level.

An attempt was made to summarize concerns regarding Quality-of-Service-based offerings. The three cases below were identified:

1. QOS differentiation with arrangement by service provider
    a. Some participants considered this arrangement acceptable. However others expressed competitive concerns due to exclusivity.
2. User-chosen QOS service differentiation
    a. This describes scenarios where either the user pays directly for enhanced QOS or the application provider may subsidize the cost of enhanced QOS (serving as proxy for user). Participants, in general, expressed no policy based objections but noted that a service provider may not find this to be a viable business model.
3. Application selects priority
    a. No common view was reached in this area. It was viewed as a complex subject both from a technical as well as a policy perspective.

Regarding who pays for QOS, there was a common view that it was, in general, not controversial if the user pays for this benefit (i.e., user pays for greater bandwidth or an assured minimum level of service). Some participants also felt that if an application provider paid for QOS, the process needed to be open and available to others on similar terms. Others expressed concern about the potential for anti-competitive behavior manifest through individual negotiated agreements. Service providers present expressed some concern that it is difficult to pre-determine an optimum business model and that it can be complex to extend a solution developed for a specific application to a generalized service offering. In this context, service providers assume a risk for investment in capacity or network capabilities that are necessary for proposed general service offerings.

The afternoon session began with a discussion of the term "managed services." One participant offered as examples of managed services:

- Video on Demand Services
- Multi Channel Video
- Packetized Voice Telephony
- Virtual Private Networks using Transport Layer Security (VPN/TLS)
- Frame Relay Services
- Asynchronous Transport Mode (ATM) Services
- Flex T service (sub-rate T1 carrier services)
- Telemedicine Services
- Public Safety Services
- Video Conferencing

Some participants noted that Video on Demand is done today using Internet Protocol, but not over the Internet. Others noted that network convergence is making the transition of service offerings to Internet Protocol the general trend, and asserted that Commission policies for the open Internet should not extend to to services that simply use the Internet Protocol..

Attempts were made to define "managed services". One participant suggested that managed services were those services that "don't touch the Internet." This definition was countered by examples. Others suggested managed services reserve bandwidth or receive priority or QOS from the network. Some suggested that only open, managed services with the same capabilities available to all competitors should be supported, though participants noted that, as previously described, scaling to a general offering is difficult and requires the service provider to assume risk. Another participant advanced an argument that all services should be required to be provisioned over the Internet, while others countered that purpose-built service bundles with characteristics such as QOS and bandwidth are required by the market. Another suggested that managed services might be distinguished by whether they are subject to existing regulatory categories such as Title II and Title VI

One participant suggested that the availability of diverse types of video on the web suggests that service providers cannot argue that they need to offer video in the form of managed services with prioritization and QOS. This was countered by noting that VOD on the web is a different application with different service requirements for a different market. As an illustration, the participant noted that consumers expect near-instantaneous delivery of video (channel surfing) in one application, while web-based VOD occurs in a different context. One service is carefully managed to achieve this, the other provides a different set of benefits in the context of its intended audience.

The discussion drew to a close with the beginning of an effort to discuss the definition of Internet access service. One participant suggested that the use of resources administered by the Internet and a reachability criterion such as a "ping test" might form such a definition.

The group plans to continue its discussion of these matters at another meeting which is scheduled for Thursday March 11, 2010.

Julius Knapp, Chief
Office of Engineering and Technology

Attendees

Name	Organization
Tom Anschutz	AT&T Labs
Fred Baker	Cisco
Saurbh Chhabra	FCC
Michael Goldstein	FCC
Tim Hilfiger	FCC
Walter Johnston	FCC
Scott Jordan	UC Irvine
Kevin Kahn	Intel
Zac Katz	FCC
John Kiefer	FCC
Julius Knapp	FCC
James Miller	FCC
Alison Neplokh	FCC
Stagg Newman	FCC
Jon Peha	FCC
Jay Rolls	Cox Communications
Art Spivy	Clearwire
Dave Tennenhouse	New Venture Partners
Robb Topolski	New America Foundation
Lauren Van Wazer	Cox Enterprises
Richard Woundy	Comcast
David Young	Verizon